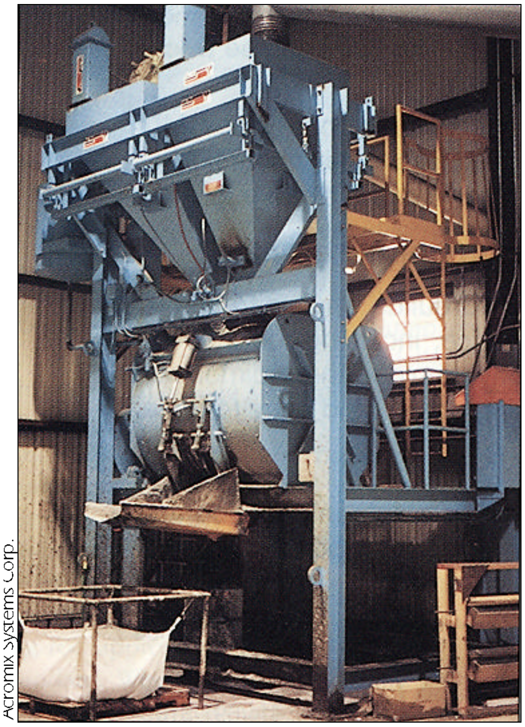
Weigh batchers guarantee accurate and consistent batching

By Rosalie Johnston

The process of batching concrete relies on combining accurate amounts of the proper components to achieve a specified type of concrete. While the unexperienced observer may think that the heart of ready mix production takes place in the mixer, those familiar with the process know this is not true. They realize that producing ready mixed concrete relies on accurate proportioning and weighing of materials before they are even put in the mixer. Here is where weigh batchers gain their reputation as crucial components in the production of concrete.

Weigh batchers measure specified amounts of sand, cement, and aggregate to ensure that concrete is batched correctly. These instruments weigh materials before they are placed in a mixer, so that the correct concrete mix can be obtained. Their role at a ready mix plant is to make concrete production more accurate and efficient.


Acromix Systems Corp.

Twin-overhead batchers ensure that the correct amount of cement will be added to the mix.

Weigh batchers also guarantee consistency from one batch to the next, by providing accurate weights. Consistency is extremely important on jobs where more than one batch of concrete is required. Knowing exactly what amounts of which materials were used in one batch guarantees that the batch can be duplicated. A properly functioning weigh batcher performs the necessary precise weighing.

What do weigh batchers measure?

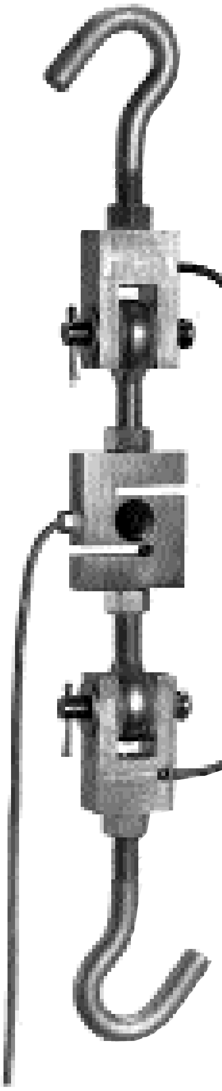
Some components of a concrete mix, such as water and admixtures, are measured by volume. They can be measured in a liquid measuring meter or in a calibrated tank or container. However, it is not practical to measure cement, sand, and aggregate this way because their volumes can change with compaction levels and moisture levels, and thereby create a mix that does not meet specifications. Weigh batchers, therefore, are used to weigh these materials.

Electronic vs. mechanical

Weigh batchers function in one of two ways—either mechanically or electronically. Mechanical weigh batchers are dial-type scales that use springs to measure weight. These weigh batchers were once the standard for the industry and are still used in some older plants. Often, if they are still used at a plant, it is to serve as a backup for an electronic scale.

Electronic scales are more frequently used today. They are suspended by load cells which convert force into a measurable electric quantity. A hopper, tank, or other weigh vessel is mounted on load cells that convert strain into an electrical signal. Electronic scales offer accuracy, reliability, and little need for repair.

Most ready mix plants rely on load cells, such as the one shown here, for accurate weighing of materials.

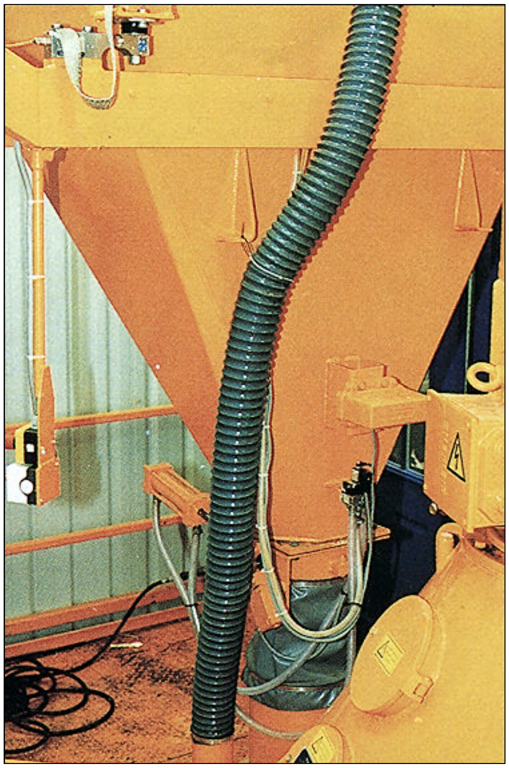

Auto-Control, Div. of Cardinal Scale Mfg. Co.

Types of weigh batchers

Electrical weigh batchers are available in a variety of forms. The type of batch plant—high-silo, low-profile, or underground—will determine which type of weigh batcher should be used. Certain weigh batchers are better-suited than others for a particular type of plant. Scales can be stationary ones that are not moving while they are weighing, or they can be nonstationary scales that weigh as they transport materials.

Stationary batchers. A scale can consist of a round, rectangular, or square hopper that is hung from one or more load cells. Cement, sand, or aggregate is weighed in this batcher that cannot move materials on its own. This choice of weigh batcher is common for stack plants where the batcher is mounted above the mixer. These batchers reportedly provide a high degree of accuracy and fit in well with high-silo plants.

Nonstationary batchers. Another type of batcher is considered stationary by some and nonstationary by others. It is still while loaded, and then it is able to transport material. With this method a conveyor belt is suspended by load cells under a bin set. When the conveyor motor is off and the belt stopped, bin gates are opened and material is weighed out on the stopped belt. After sand, cement, and aggregate are batched, the material is carried on to its final destination. Stationary belt conveyors can usually be found in low-profile or underground batch plants. One manufacturer explains that a second type of nonstationary batcher is a skip hoist and describes that it has a scale built into the down position. Bin gates feed the hoist in the down position. After batching is complete, the hoist lifts and transfers the material to its destination. These weigh batchers are also typical of low-profile and underground plants.


Cement weigh batcher is supported by load cells for accuracy and reliability.

Advanced Concrete Technologies Inc.

Another type of nonstationary batcher is a traveling batcher. This is a cart with load cells that moves along a track under a series of bins. The cart stops under each bin and the bin gate opens to discharge the required weight of material into the cart. The cart has a bottom discharge bucket or a bucket that is lifted out by tipping arms or skip hoist. Again, this weigh batcher works well in low-profile plants.

Load cell selection

- All load cells must be of the same capacity.
- Estimate the vessel tare weight (the weight of an empty container or vehicle, or the allowance or deduction from gross weight made on account there of), including all piping, pumps, agitators, insulation, and vessel heating fluids.
- Add the maximum net weight of product to be weighed to the tare weight. This is the gross weight of the vessel and contents.
- Divide the gross weight by the number of legs or support points. This is the nominal weight which will be carried by each load cell.
- Select a load cell with a capacity somewhat greater than the nominal weight. The following should be considered when determining how much greater the load cell capacity should be: Is your tare weight accurate? Will the load be evenly distributed on all cells? Is the vessel fitted with an agitator or subjected to shock loading? Is it possible your vessel will be overfilled, exceeding your net weight value?
- A good rule of thumb is to select a load cell with a capacity 50% to 100% in excess of the calculated nominal load per cell. Once the load cell capacity has been determined, check that the net weight signal is adequate for the instrumentation selected.

Source: Rice Lake Weighing Systems

Sizes and capacities

In determining the correct weigh batcher for a plant, the capacity of the load cells is important. Select load cells for the range in which you will usually be weighing. If most of your batching is small, than a lower-capacity load cell is appropriate. However, if large batches are more typical for your plant, than load cells that can measure large quantities are important. Load cells are available in a wide range of capacities, so there should be one to match your plant's needs.

See the sidebar for one manufacturer's guidelines for selecting the proper load cell.

Maintainance guidelines

It is important to check the sensitivity of the scale to ensure accurate measurements. After applying a load, the indicator should return to the same position, and the indicator should respond to even light weights that are applied. Difficulty in a scale returning to its tare or zero condition can be caused by a number of factors. If the aggregate batcher does not completely empty, there may be a problem with a vibrator. If a cement batcher is having problems, a dust collector or batcher vent may not be working properly.

During the course of a day, a gradual change in tare often occurs. This happens when material accumulates on or sticks to the weigh batcher. This problem can be solved by thoroughly cleaning the batcher at the beginning or end of the day to remove built-up materials. It is best to examine and carefully follow the weigh batcher manufacturer's guidelines and manuals to keep the equipment functioning properly.

Computerized weigh batchers

Computer systems that work with electrical weigh batchers are available from many manufacturers. They bring a high level of efficiency to the batching process, offering smooth operation that can be better timed for greater productivity and mix continuity. Specific batch formulas can be entered into the computer to achieve the same results over and over. Also, the computer will display and record what tolerances the plant is batching within. This allows the plant to keep better records and provides documentation of the level at which the plant is performing. ✣

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